

Section 3

Quality Assurance/Quality Control Measures

Several QA/QC measures were implemented to provide qualitative and quantitative checks on data. Field QA/QC measures for the March 2007 monitoring event included duplicate samples, equipment/rinseate blanks, field blanks, decontamination water blanks, and trip blanks. The results of these QA/QC measures are discussed below.

3.1 Duplicate Samples

One duplicate groundwater sample was collected for every 20 groundwater samples as a check for sample homogeneity and laboratory precision. Duplicate samples were collected from one B-Sand well (MWB027), two C-Sand wells (EWC002 and MWC009), and one Gage Aquifer well (MWG002). Duplicates were collected, numbered, packaged, and sealed in the same manner as the primary samples. Duplicates were assigned separate sample numbers and submitted blind to the laboratory. Duplicate samples were analyzed for VOCs.

Duplicate samples were collected to evaluate data precision, expressed in terms of percent difference. The relative percent difference (RPD) is calculated as follows:

$$\frac{\pm 2(D_1 - D_2)}{(D_1 + D_2)} * 100$$

where D_1 = Original analysis and
 D_2 = Duplicate analysis

The primary and duplicate results from these wells (refer to Table 7) indicate the RPD ranged from 4.9 to 11.8 percent for TCE, 2 to 13.3 percent for 1,1-DCE, and 5.6 to 8.7 percent for cis-1,2-DCE. The highest RPD of 13.3 percent for 1,1-DCE was associated with the samples from well MWB027; 1,1-DCE was detected at 140 µg/L in the primary sample and 160 µg/L in the duplicate sample. The RPDs between all the sample sets were within 15% or less indicating acceptable precision (typically within 20 percent) of the laboratory analysis.

3.2 Equipment/ Rinseate Blanks

One equipment/ rinseate blank was collected each day of sampling after decontaminating the sampling equipment with deionized water as a check for cross-contamination during sample collection. Deionized water provided by the laboratory was used to rinse the sampling equipment after the equipment was cleaned, then collected in the sample containers. A total of 12 equipment/ rinseate blanks were analyzed for VOCs by EPA Method 8260B.

The equipment blank sample collected on March 28, 2007 had detections of bromodichloromethane, chloroform, chloromethane, and dibromochloromethane. Trace levels (mostly single digit $\mu\text{g/L}$ values) of these VOCs were also detected in the decontamination water, field blank, and trip blank samples that were collected on March 28, 2007. Of these VOCs only chloroform was detected in the monitoring well samples (IRZCMW003) on March 28, 2007; however, the detection in the monitoring well sample was a trace value (J value). Based on this information, CDM concludes that these detected VOCs in the equipment blank do not impact the usability of the data.

Tetrahydrofuran (THF) was also detected in the equipment blanks collected on 10 of the 12 days of the March 2007 sampling event. THF was also detected in the associated laboratory method blanks and is therefore attributed to laboratory contamination rather than cross contamination during sample collection.

Methylene chloride was detected in one of the equipment blanks collected on March 21, 2007 at a concentration of $2.3 \mu\text{g/L}$. This detection in the equipment blank does not impact the usability of the data because the project sample results were significantly greater than the detections in the blank.

3.3 Field Blanks

Field blanks are samples that are filled in the field with laboratory-supplied water to check for possible contamination in the sample collection methodology. One field blank was collected each day of sampling for a total of 12 and analyzed for VOCs by EPA Method 8260B.

Similar to the equipment blank sample, the field blank sample collected on March 28, 2007 had detections of bromodichloromethane, chloroform, and dibromochloromethane and THF was detected in 10 of the 12 field blanks samples. Trace amounts of acetone and methylene chloride was detected in one or more of the field blanks. These levels of blank contamination do not impact the usability of the data because either all project sample results were significantly greater than the blank contamination or the blank detection itself was an estimated value.

3.4 Decontamination Water

One water sample was collected each field day from the water used for decontamination of the sampling equipment for a total of 12 samples and analyzed for VOCs. Trace levels of bromodichloromethane, chloroform, dibromochloromethane, THF, acetone, and methylene chloride similar to the equipment and field blanks were observed in the decontamination water samples.

3.5 Trip Blanks

One trip blank was submitted to the laboratory each day of sampling in the same cooler as the groundwater samples to check for possible cross-contamination. A total

of 12 samples were shipped during the March sampling event and analyzed for VOCs.

Trace levels of bromodichloromethane, chloroform, dibromochloromethane, THF, acetone, and methylene chloride, similar to the other blanks, were observed in the trip blanks.

3.6 Data Validation

Data validation was performed by Laboratory Data Consultants, Inc. (LDC) of Carlsbad, California. Copies of the data validation reports from samples collected in November 2006, December 2006, and March 2007 are presented in Appendix E. The validation process followed the U.S. Environmental Protection Agency (EPA) Contract Laboratory Program National Functional Guidelines for Organic Data Review (EPA, 1999 and 2002). Approximately 20 percent of the laboratory data was reviewed to verify that the data are of acceptable quality. The data packages to be validated were selected randomly. Forty seven percent of the selected data packages were subjected to Tier 1 validation, 37 percent were subjected to Tier 2 validation, and 16 percent were subjected to Tier 3 validation.

A total of five samples collected during the November and December 2006 sampling event were randomly selected for validation. Two samples (MWC015_WG11006_001, MWC016_WG112006_0001) were subjected to Tier 1 validation; two samples (IWC002_WG112106_0001, MWC024_WG112106_001) were subjected to Tier 2 validation; and one sample (IWC001_WG112106_0001) was subjected to Tier 3 validation. Based on the results of the data validation, the data show an acceptable degree of precision and accuracy and can be used for the project purposes. It should be noted that LDC treated the samples from November and December 2006 as one event for the purposes of selecting data for validation.

A total of 14 samples collected during the March 2007 sampling event were also submitted to LDC for validation. Seven samples (MWB013_WG031407_0001, MWG004_WG031407_0001, TMW_14_WG031407_0001, TMW_11_WG031407_0001, WCC_5S_WG031407_0001, MWC021_031407_0001, and MW3009_WG030807_0001) collected on March 8 and 14, 2007 were subjected to Tier 1 validation; five samples (MW3012_WG030807_0002, MWB028_WG032207_0001, MWB027_WG032207_0001, MWB027_WG032207_0002, and CMW002_WG032207_0001) were subjected to Tier 2 validation; and two samples (MWB019_WG032707_0001 and MW3012_WG030807_002) were subjected to Tier 3 validation. Although some data were qualified as estimated due to laboratory QC accuracy issues or laboratory blank contamination, none of the data were rejected. Therefore, based on the results of the data validation, all data are considered usable for the project purposes.